RealEnergy Inc.

Enterprise-Wide Distributed Generation Energy Management System

Goals

To apply distributed generation (DG) across an enterprise or as a virtual utility for reliable and economic power generation, effective tools for management and control are required. The goal of this project is to develop and perfect a system to monitor and control DG for optimal performance and operation.

This work examines design and operational issues, communications standards, and experience with regulatory and market barriers while implementing this business approach.

Current Results

Business Model and System Design

RealEnergy (RE) has nearly 5 MW of DG and combined heat and power (CHP)/DG installed at 17 commercial properties in three utility territories. Five more installations are in progress.

RealEnergy Installations	*Projects*
Solar	3 projects – 330 kW
Microturbine	1 project – 60 kW
Internal combustion (with and without CHP)	12 projects – 4.2 MW

RE operates a range of DG systems to serve a portion of its commercial business clients' on-site power needs

These systems provide approximately 50% of the building's load and operate primarily during peak demand periods. RE uses a standardized, packaged system approach to capture the benefits of improved reliability, lower cost, and faster implementation.

RE has installed a few solar electric (PV) systems, but at this time the majority are internal combustion (IC) systems. These systems use natural gas to meet strict air quality standards and are fuel-efficient and scalable.

Challenges addressed to achieve optimal performance and operation include:

- Entitlements (air, building, and interconnection)
- Utility barriers to entry (standby, departing load)
- Technology/manufacturer
- Building integration
- Profit/savings
- Scaling (systems, multiple locations)
- Optimizing thermal applications and system operations.

Distributed Energy Information System

The systems are usually installed in commercial buildings with one or more DG technologies operating in parallel to the utility grid. For RE's needs, the distributed generators are metered, managed, and monitored through its Distributed Energy Information System (DEIS), built using "off the shelf" technology.

RE's technical design criteria included precision (quality and quantity of outputs), compatibility with existing building energy management systems, hardware/software integration in the platform device, durability, and remote operation. Business considerations included cost, data ownership, and versatility.

The DEIS has three functional requirements:

1. Communicate and operate the DG system on site
2. Interface and manage the system with the host facility
3. Communicate with corporate servers, mobile operations, and maintenance staff.

The DEIS gathers information about each DG system and reports to a central control station, providing complete management capability as well as records to support billing for services. Measured parameters are summarized in the following table.

Dispatch Inputs and Metering Outputs	
Inputs:	
• Simple dispatch protocols for California	
Outputs:	
• Voltage	• Power
• Current	• Frequency/Power Factor
• Power	• Energy/Site Demand

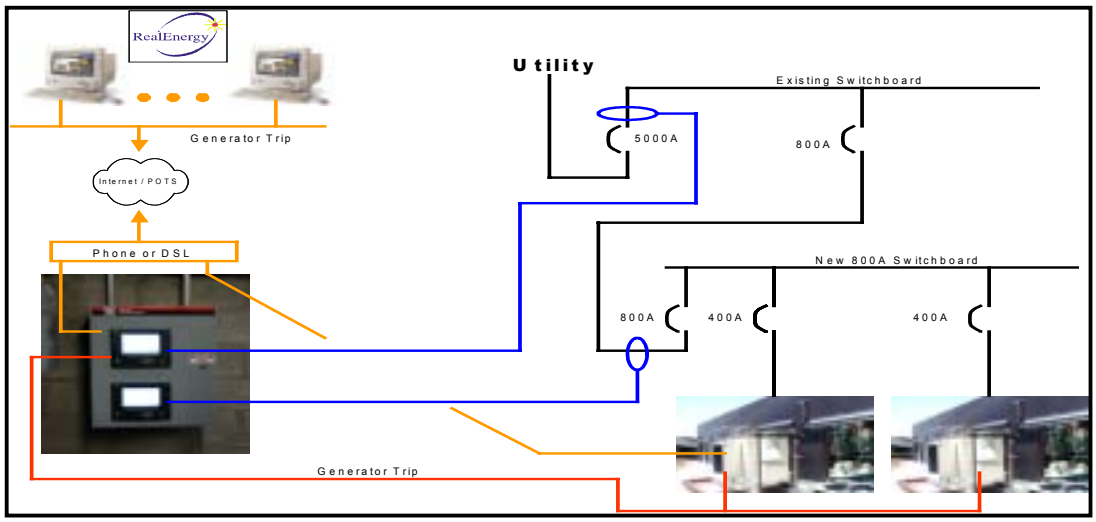
The RealEnergy Distributed Energy Information System collects numerous inputs for each system

Interconnection Experience in California

Installing and interconnecting DG in California requires both time and money to meet the regulatory and business transaction costs associated with construction and operation. RE experiences over 2001 through early 2002 varied by the particular utility.

Because the RE installations are more than 10 kW, a supplemental review was required, adding $10,000–$20,000 per project. Issues RE encountered during the supplemental review included:

- No standardized application requirements
- Utility/inspectors need more experience and understanding of DG/CHP
- Need for formalized communications between utility personnel and applicants
- Standardized definition and protocol for a “complete” application
- Different requirements across utilities
- Different utilities required different types of protection devices.



Example of the RealEnergy standard metering configuration for a site with two DG systems

Website Access

Data for selected facilities are available on the RealEnergy Web site, under Distributed Generation, at http://www.realenergy.com/.

Illustration of information available from the Distributed Generation page of the RealEnergy Web site

Distribution and Interconnection R&D (Formerly Distributed Power Program)

DOE’s Distribution and Interconnection R&D supports the development of technologies and policies that enable distributed generation (e.g., photovoltaic systems, wind turbines, fuel cells, and microturbines), storage, and direct load control technologies to be integrated into the electric system. Through a collaboration of national laboratories and industry partners, DOE's Distribution and Interconnection R&D pursues activities in: (1) strategic research, (2) technical standards, (3) distribution system technology, (4) interconnection technology, and (5) mitigation of regulatory and institutional barriers.

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Additional Distributed Power Information
http://www.eren.doe.gov/distributedpower

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